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The transition from dynamics to statics in the electron-spin-resonance spectra of impurity Mn2+ ions in strontium titanate

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Abstract

The electron-spin-resonance (ESR) spectra of SrTiO3:Mn single crystals have been investigated. Results unambiguously indicate that the impurity center formed by an Mn2+ ion has a dynamic nature. In the high temperature range (T > 100 K), ESR spectra of Mn2+ ions reveal cubic symmetry; the spectrum is found to broaden significantly with a decrease in temperature. Upon cooling to T < 10 K, low-symmetry centers of Mn2+ ions with a strong orientational dependence emerge in the spectra. Temperature evolution of the ESR spectrum can be described within the model of a dynamic off-center Mn2+ ion substituting for the Sr 2+ ion, with a transition to the static regime at low temperatures with an average localization energy of ~2.4 ± 0.4 meV for Mn 2+ centers due to random deformations. © 2014 Pleiades Publishing, Ltd.

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